

probably often accompanied by a nauseous flavour, there is good reason to suppose that they are in effect a means of protection from insect-eating enemies. We have much actual evidence bearing upon the point. Evil-smelling butterflies, like the *Acræas* or the well-known *Limnas chrysippus* (a large brown butterfly common throughout many parts of Africa and Asia), are often conspicuous, slow-flying, and given to courting observation rather than to avoiding it. These are all marks of butterflies which are more or less immune from attack by birds; and it may be added that the frequency with which many of them are copied by other butterflies gives further reason for the conclusion that they enjoy protection in virtue of their distasteful qualities—a protection which other butterflies are enabled to share by resembling them in outward appearance.

Now, granted that the avoidance of attack by birds is the object of the repulsive scents, we should, of course, expect to find them present not in one sex only, but in both alike. And this is precisely what we do find; moreover, since it is well recognised that the preservation of the life of the female is more important than that of the male for the welfare of the species, we should expect that if there is a difference between the sexes in the intensity of the odour, that difference would be in favour of the female. This, again, is borne out by observation in a number of cases. Where both sexes are repulsive, the female, as a rule, is the more repulsive of the two, and therefore (as a consolation) the safer from attack.

So much for the odours unpleasant. Now let us turn to the other kind, the fragrant flower-like perfumes with which we dealt at the outset. These, we saw, are frequently associated with specialised scales which are the exclusive property of the male sex. We cannot say quite so much for the odours themselves, for though in the great majority of cases they belong to the males alone, yet the females are not left entirely destitute. Fritz Müller many years ago found evidence of sweet scent in a female white butterfly, and since then Dr. Longstaff has detected in the females of several species a fragrance not unlike that of the male, but usually much weaker. Still, we may certainly say, speaking generally, that the pleasant odours show a vast preponderance in favour of the male. This suggests that they must have some significance in regard to the relations between the sexes; and, indeed, there can be little or no doubt that, as was first pointed out by Fritz Müller, these scents are employed by the males in courtship as a means of attraction; they may also perhaps serve as a means of recognition. That their employment is occasional, and not constant, appears from the fact that they are so often furnished with a provision for keeping them confined until wanted. There is, so far as I am aware, no direct evidence that they are more plentifully liberated during courtship; but to anyone who has observed the persistent fluttering of white butterflies about and around each other under those circumstances, it can hardly fail to occur that the fanning wing-movements of the male must have the effect of encouraging the evaporation and diffusion of the odour; also perhaps of aiding its escape from the disc through the footstalk and so into the lamina of the plume-scale. The flowery scents would thus come under the head of those features which have been called by Prof. Poulton "epigamic"; characters, that is, which, like the splendid plumage of some cock-birds, are believed to further the cause of matrimony. If this interpretation be correct, it is most interesting to find that the æsthetic preferences of butterflies in the matter of scents are so much like our own. In other insects, as well as in many of the higher animals, we find attraction exercised by odours that to our senses are disgusting. Butterflies themselves are not exempt from a depraved taste where food is concerned; the best bait for the purple emperor is well known to be a piece of putrid meat. But in matters of love-making, the butterfly seems to resort for his means of fascination to methods which recall the human lover with his gifts of flowers and boxes of vanilla chocolate.

The evil odours tend to be somewhat persistent. In some cases they may be detected for a long time after the butterfly is dead and stiff. The agreeable scents, on the other hand, are usually evanescent, becoming imperceptible very soon after the insect has ceased to live. On one occasion I was able to detect the lemon-plant odour of a green-veined

white when the butterfly had been dead for eleven days, but this is probably an extreme case. Both kinds of odour may be present in the same species; when this is so, it is commonly found that the first impression given by the butterfly is a disagreeable one, the pleasant constituent only becoming apparent when its distributing apparatus is specially exposed. These cases of a double odour follow the same rule of repulsive scents being common to the two sexes, and agreeable perfumes being confined to the male.

This finishes what I have to say on the subject of the scents of butterflies. I am conscious that I stand in need of your indulgence; as, from the force of unavoidable circumstances, I have had but a short time in which to prepare this lecture. But, "qui s'excuse, s'accuse," and I trust that in spite of its sketchy and imperfect character the discourse to which you have just listened may have succeeded in quickening the interest that most of us feel in these very attractive objects of nature, and in giving fresh emphasis to the fact that the study of insects in general, and of butterflies in particular, is capable of shedding light upon questions of high importance in the science of biology.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

MR. HUGH GUNN, formerly Director of Education of the Orange Free State, has accepted an invitation from the Government of Western Australia to act as adviser and organiser for the university which that State is founding at Perth.

MR. W. H. McMILLAN has been appointed to the newly founded chair of mining at University College, Nottingham. Prof. Heaton has been appointed principal of the college in succession to the Rev. J. E. Symes, who has resigned.

AMONG the bequests of M. Marino Corgialegno, a naturalised British subject, who died on April 26, are:—40,000*l.* to institute a school at Athens on the lines of Eton or Harrow, "sharing in the desire expressed to me by his Majesty King George that education in Greece should be rendered more perfect by the establishment of a public or secondary school upon the model of the English public schools, where boys will receive a regular course of teaching as well as of good breeding"; 40,000*l.* for a school for craftsmen at Argostoli, in the island of Cephalonia; 15,000*l.* for technical scholarships; 10,000*l.* each for a school for girls in Cephalonia, for schools or gymnasia in Argostoli, for a public library at Argostoli, for the Agricultural Society at Athens, for a polyclinical hospital in Athens, and for the Society for the Propagation of Useful Books.

THE Educational Science Section of the British Association will meet at Portsmouth, under the presidency of the Right Rev. J. E. C. Welldon, Dean of Manchester. The president in his inaugural address, which will be delivered in the section on Thursday, August 31, will treat of educational problems of the day. His address will be followed by a discussion on the overlapping between secondary schools and universities and other places of higher education, which will be opened by Prof. A. Smithells, F.R.S., and Prof. R. A. Gregory. On Friday, September 1, there will be a discussion on the place of examinations in education, with papers by Mr. P. J. Hartog, Miss Burstall, Dr. T. P. Nunn, and Mrs. Dr. White. The discussion will be opened by Mr. A. A. Somerville and Mr. W. D. Bentliff. A discussion on grammatical terminology will be opened by Prof. E. A. Sonnenschein and Mr. P. Shaw Jeffery. On Monday, September 4, the subcommittee on mental and physical factors involved in education will present its report, which will deal with the question of feeble-mindedness in children. There will be a discussion on the diagnosis of feeble-mindedness, with papers by Dr. Abelson, Dr. C. W. Saleeby, and Dr. Tredgold, followed by a discussion on the education of feeble-minded children, with papers by Mrs. Burgwin, Miss Dendy, and Dr. Auden. Prof. J. A. Green will also read a paper on backward children. On Tuesday, September 5, there will be a discussion on practical education in the Dockyard and Naval Schools, with papers by Mr. George Dawe, headmaster of the Dockyard School, and Mr. W. H. T. Pain, of H.M.S.

Fisgard. The discussion will be opened by Dr. C. W. Kimmins. A paper on the study of German will also be read by Mr. G. F. Bridge, and a paper on school books and eyesight by Mr. G. F. Daniell.

A "MEMORANDUM on Physical Training in Secondary Schools" has just been issued by the Board of Education, and is obtainable from Messrs. Eyre and Spottiswoode, price 2d. That physical education at the secondary-school age is of primary importance scarcely needs to be insisted on, but it is well to have the large generalities of such education set forth, as here, in a coherent exposition. The secondary school covers the adolescent age of boys and girls—the age when growth is very rapid and the transit to manhood and womanhood demands all the care and knowledge that the best informed teacher can provide. The present memorandum does take some account of this, but does not emphasise it quite so much as the trainers of male and female youth might properly expect. Under the "objects of physical training"—it is a pity that the term "physical education" is not uniformly used—Sir George Newman gives a good summary of the nervous basis of training and the value of training in promoting "habits of discipline, obedience, ready response, and self-control." Doubtless, physical education, being a special department of mental education, *can* be used to generate such "habits"; but why insist on the merely passive aspect of education? The end of education is not to produce habits of obedience or ready response except as means to the greater end of personal self-sufficiency and independence of character. Self-development is as important as self-control, and presupposes it. But Sir George Newman is not unaware of this, for he says, "undue emphasis should not be laid upon the disciplinary effects of physical training." He justifies the Swedish system on the whole. He gives general directions as to length of lessons, the place of physical education in the time-table, and the qualifications of the teachers. "Especially as regards children and young people, physical training is not a mere matter of technical expertise." "Girls should, of course, be taught by women." Any system should be practised under the general supervision and with the constant cooperation of the medical officer of the school. The memorandum is really a memorandum, and should be to every secondary-school teacher a constant reminder of the principles and risks of physical education.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, July 24.—M. Troost in the chair.—**H. Deslandres**: Remarks on the movements of the solar prominences. The author regards the upper layer of the solar atmosphere as being ionised and under the action of a magnetic field. This field causes movements in the solar ions, especially those rising and falling. The theory explains easily all the observed peculiarities of the velocity of rotation in the prominences and the upper layer. In the present paper some further consequences of this theory are developed, and a scheme of research suggested for its control.—**A. Laveran** and **M. Roudsky**: Concerning the action of oxazine (triaminophenazonium chloride) on trypanosomes. The selective action of the centrosomes of the trypanosomes for oxazine, noted by Werbitzki, takes place both *in vitro* and *in vivo*. The disappearance of the centrosomes in *T. brucei*, and the fact that this morphological modification can be transmitted by heredity, is confirmed. Other species are similarly affected, but to varying degrees. The virulence of the trypanosomes submitted to the action of oxazine is reduced.—**R. Zeiller**: A Triassic flora discovered at Madagascar by M. Perrier de la Bathie.—**Emile Belot**: The period of rotation of Venus. The observed period of rotation of Venus has been recently given by M. Bigourdan as twenty-nine hours. The author points out that in a communication to the academy in 1906 he gave a general formula from which this period was deduced to be 28h. 12m.—**M. Giacobini**: Observations of the Brooks comet (1911c) made at the Observatory of Paris. Data given for July 22 and 23.

The comet appears as a rounded nebulosity 35" to 45" diameter, with a well-defined central nucleus. Magnitude 11.5 to 12.—**L. Picart** and **F. Courty**: Observations of the Brooks comet (1911c) made at the Observatory of Bordeaux with the 38 cm. equatorial. Data given for July 22 and 23. Comet showed a clear nucleus about tenth magnitude.—**Witold Jarkowski**: An approximate law for the ascent of an aeroplane.—**Marcel Brillouin**: Polymorphism and molecular orientation.—**G. Sagnac**: Some paradoxes concerning the optical actions of the first order of the translation of the earth.—**A. Cotton**: Circular dichroism and rotatory dispersion.—**G. Bruhat**: The study of rotatory dichroism of a definite organic compound (diphenyl-*l*-bornyldithiourethane).—**E. Besson**: The asymmetry of the positive and negative ions relatively to the condensation of water vapour. An attempt to record photographically the results described by C. T. R. Wilson.—**H. Buisson** and **Ch. Fabry**: The amount of energy necessary to produce the unit of luminous intensity. Working with a Heraeus quartz mercury vapour lamp, the number of watts radiated per mean spherical candle was found to be 0.31 for the violet (4538), 0.018 for the green (5460), and 0.031 for the yellow (5780).—**M. Herschfinkel**: The action of the radium emanation on thorium salts.—**Ettore Cardoso**: The densities of the coexistent phases (orthobaric densities) and the diameter of sulphur dioxide in the neighbourhood of the critical point. Part of a series of researches on the law of the rectilinear diameter at temperatures near the critical point. The influence of agitating the liquid under experiment is clearly shown in the results.—**L. Tchougaeff** and **P. Koch**: An anomaly of the molecular refraction in the series of the substituted gloximes.—**L. Gay**: The notion of an expansibility pressure.—**Victor Henri**: Study of the ultra-violet radiation of quartz mercury vapour lamps. The ultra-violet rays from a mercury lamp increase very rapidly with the watts used, this increase being especially rapid in the neighbourhood of 200 watts. The action on citrate of silver papers is parallel with the bactericidal action upon the coli bacillus, and the yield of such a lamp when used for sterilising purposes may be very conveniently controlled by such papers.—**G. Massol** and **A. Faucon**: The latent heat of fusion and specific heat of the fatty acids. The discrepancy previously noted between the latent heats of fusion and solidification of formic, acetic, and propionic acids is now shown to occur with lauric acid. The possible causes of this difference are discussed.—**G. Darzens** and **F. Bourion**: The action of thionyl chloride upon metallic oxides. In numerous cases in which the action of thionyl chloride upon metallic oxides was studied the chloride behaved as a mixture of chlorine and sulphur dichloride. Since the latter is easier to prepare and purify, its use for chlorinating oxides is preferable.—**Marcel Guichard**: The extraction of the gases from copper by a chemical reaction, and the estimation of oxygen. Methods are described for converting copper either into the iodide or oxide, and recovery of the gases contained in the metallic copper. The limits of error of the two methods are indicated.—**Georges Dupont**: The catalytic preparation of some substituted ketohydrofurananes. Some examples of the hydration of some acetylenic pinacones by the catalytic action of a dilute solution of mercuric sulphate.—**Frédéric Reverdin**: The nitration of the ortho-, meta-, and para-nitrobenzoyl-*p*-anisidines.—**Marcel Delepine**: The sulpho-ether salts or thionic esters R.CS.OR'.—**H. Colin** and **A. Sénechal**: The action of acids on the catalytic oxidation of the phenols by ferric salts.—**R. Locquin**: α -Methyl-laurenone, a new ketone derived from camphor. Baeyer and Villiger have shown that one of the products of Caro's reagent on camphor is a lactone, $C_{10}H_{16}O_2$. A compound $C_9H_{14}O$ has been isolated in the course of researches made to determine the constitution of this lactone, and this compound is shown to be a tetramethylcyclopentenone. It is a methyl derivative of the laurenone previously described by Tiemann.—**Th. Nicloff**: The ovule and the embryonic sac of the Plataneæ.—**A. Guilliermond**: The formation of the chloroleucites at the expense of the mitochondria.—**P. A. Dangeard**: Complementary chromatic adaptation in plants.—**A. Magnan**: The digestive surface of the ventricle and the muscular